cracking. Patients are instructed to stay out of direct sunlight for four to six months because a substantial number of melanocytes are removed during the peeling process. In the event of sun exposure, all patients should wear a sunscreen with a sun protection factor of 15 or greater.

Complications are most frequently related to pigment changes. In patients with darker complexions, hyperpigmentation may develop over treated areas, which, although usually transient, can be permanent. This can be prevented or minimized by applying hydroxyquinone, a bleaching agent, before or after the peel. In addition, the erythema seen in all chemically peeled skin may persist for several months. Involution of the redness is accelerated by the application of a steroid cream, if needed. The most serious complication is hypertrophic scarring or full-thickness skin loss from a peel that extends too deeply. This can usually be avoided by reducing the concentration, the application pressure, or the duration of the peeling agent and by avoiding skin recently undermined by rhytidectomy or blepharoplasty. When used appropriately by experienced professionals, complications are rare, particularly with TCA and α-hydroxy acid peels.

No discussion of peeling agents would be complete without mentioning topical retinoic acid (tretinoin). Although not used as a peeling agent itself, it is frequently used for prepeel skin conditioning. Its mechanism of action is unknown, but it is thought to involve diminishing the cohesiveness of epithelial cells, stimulating mitosis, and causing a thickening of the dermis and compaction of the epidermis. Although approved by the Food and Drug Administration for the treatment of cystic acne only, it is currently in broad use for the long-term correction of fine facial wrinkling.

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Breast Reconstruction

A RECONSTRUCTIVE OPTION is available for almost any woman undergoing a mastectomy. Reconstruction is an important step in a woman's recovery from cancer or other breast disease. Reconstruction promotes a woman's sense of well-being, wholeness, and recovery. This option should be explained to her before mastectomy and even before she makes a decision regarding mastectomy versus lumpectomy. Women who undergo reconstruction at the same time as a mastectomy do better emotionally postoperatively. At any time following a mastectomy, however, even many years later, a woman may consider and undergo reconstruction.

Reconstruction should not be postponed because of the possibility of further treatment, such as chemotherapy. Chemotherapy cannot start until the patient recovers from the mastectomy. Recovering from the reconstruction, therefore, if done at the same time as the mastectomy, does not delay the start of chemotherapy. In addition, it has been shown that breast reconstruction does not interfere with the early detection of recurrence of breast carcinoma.

In general, breast reconstruction can be divided into two types, using either autologous tissue or implants. Reconstruction involving implants first requires the use of a tissue expander. This is placed at the time of the initial mastectomy, under the pectoralis muscle. The tissue expander is then slowly inflated to stretch the mastectomy flaps. Once the flaps have been expanded to a size larger than the opposite breast, a second procedure is done to exchange the expander for a permanent saline or silicone implant. The second procedure can be done on an outpatient basis, using either local or general anesthesia.

A reconstructed breast using an implant is usually higher, firmer, and rounder than the opposite breast. The ideal patient for this type of reconstruction has small, nonpendulant breasts. It is also an excellent method for patients requiring bilateral mastectomy, as symmetry can be easily achieved.

Silicone implants are available for women undergoing reconstruction, under strict guidelines and surveillance of the US Food and Drug Administration. Saline implants also offer an excellent reconstruction for many women undergoing this procedure. In some patients with a thin skin-and-muscle covering over the implant, a rippling can occur in the upper pole of the reconstructed breast, resulting in an unnatural feel.

The second type of reconstruction involves using a patient's own tissue. Most commonly, the skin and fat of the abdomen can be elevated on one of the underlying rectus abdominis muscles and transferred to the chest area to reconstruct the breast mound. This method is called a TRAM (transverse rectus abdominis myocutaneous) flap. It generally results in a superior breast reconstruction, giving a natural feel and appearance. It also dispenses with the need for implanted materials and can be accomplished in one stage. These procedures can also be used for bilateral reconstruction because both rectus muscles can be elevated, each carrying half of the skin and fat of the lower abdomen. When reconstruction is done using only one rectus muscle, little or no abdominal strength is lost. Women who undergo bilateral reconstruction involving the use of both rectus muscles can sometimes experience abdominal and back weakness, however. Currently, the TRAM flap is the preferred procedure in postmastectomy reconstruction.

The latissimus muscle can also be transferred from the back. This usually does not provide enough tissue for an adequate breast mound and often requires the use of a supplemental implant. This is a good method for patients who are obese, smoke cigarettes, or who have had multiple abdominal operations (all of which can compromise the blood supply of flaps) and, therefore, are not candidates for a TRAM procedure. The tissue expander with

implant or latissimus muscle with implant should be considered as a reconstructive option for these patients.

In general, reconstruction of the nipple-areolar complex is accomplished, if the woman wishes, three months after her initial reconstruction. Nipple-areolar reconstruction is delayed until after chemotherapy is completed. Local tissue is used to create the nipple, and a skin graft is harvested from either the abdominal scar (TRAM incision) or the lower groin area. Following healing, the nipple-areolar complex is tattooed to match the color of the opposite side.

Although a perfect match cannot be made with the normal breast, in most cases a breast can be created that comes close in form and appearance and allows a woman to wear a normal bra and clothing.

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Skin Substitutes

BURN WOUNDS remain the most common condition requiring skin substitutes, but skin substitutes have also been used to treat dermatologic disorders such as giant hairy nevi excision, chronic skin ulcers, and pressure sores.

Skin substitutes vary from simple inert dressing materials to engineered biomaterials and cultured cells. The plethora of skin substitutes available today reflects each product's inability to meet all of the requisites of an "ideal skin." The most appropriate coverage must be tailored to the type of wound.

Wounds that retain dermal elements, or partial-thickness wounds, have deep progenitor elements within adnexa of the skin and therefore retain their capacity to regenerate. These wounds are readily treated with occlusive dressings that maintain a moist environment, reduce pain, promote re-epithelialization, and allow patient mobility during the healing process. The most commonly used occlusive dressings are Opsite and Xeroform gauze. Other moisture-retaining dressings, which some consider synthetic skin substitutes, remain a treatment option and include hydrocolloids and the newer hydrogels. For wounds requiring this type of dressing, however, synthetic substitutes function simply as expensive dressings. A note of caution with the use of hydrogels is that they lack the ability to exclude bacteria, and this dressing may favor the growth of gram-negative bacteria.

More severe wounds may have full-thickness injury, may be dirty and require debridement, or full-thickness loss may have occurred during debridement. Without the use of autologous tissue or a skin substitute, they typically close with profound contraction and scarring. Dead tissue should be excised as soon after injury as possible to limit bacterial colonization. A skin substitute should then be used to aid healing, act as a barrier to infection, or most important, to buy time for granulation tissue development, repeated harvest, or autologous cell culture.

Allograft is the current treatment of choice for skin substitution. Depending on the quality (viability) of its preparation and the patient's wound-induced immunosuppression, engraftment does take place and can provide prolonged coverage. Tissues, for historic reasons, are not regulated by the US Food and Drug Administration (FDA). As a result, the quality may be highly variable and often not available.

The quest for a cheap, available, and reliable new material is still active. Biobrane II (Dow-Hickham) is now the only biosynthetic device approved for use as a skin substitute by the FDA. It is a porcine type I collagen-coated nylon mesh (for tissue ingrowth) with a thin silicone (moisture barrier) backing. Although its certified use is for the long-term coverage of wounds left by the debridement of full-thickness burns, its successful use as a donor-site dressing to speed healing and to provide comfort has been reported. In full-thickness burn wounds, the Biobrane engrafts and, on removal, the silicone sheet separates, leaving the collagen base in the wound. The synthetic substitutes are far less resistant to wound contamination than either autologous or allogeneic skin grafts. With infection, complications range from a loss of adherence of the device to invasive sepsis and death.

Cultured autologous epithelium represents an important advance in the area of skin substitutes. This is the only permanent skin substitute and necessitates biopsy and culture of autologous keratinocytes. The burn wound is excised to expose viable tissue and requires a substitute for coverage while the clonal expansion of cultured cells takes place—usually about three weeks. Once available, the cultured epithelial grafts are placed on the granulating wound bed. This has resulted in a 20% to 70% take as compared with a 95% take for traditional autograft. Cultured keratinocyte autograft is able to form anchoring fibrils without a dermal component present, but this can take from 6 to 12 months. This interim graft instability accounts for the complications of sloughing, blistering, scarring, and wound site contraction. This phenomenon is attributable to the lack of a dermal component that, if present, promotes early anchoring fibril formation. The current state of the art in autograft keratinocyte culture depends on good allograft take. Instead of removing the entire allograft, just the epithelium is removed with a burr or dermatome to retain the engrafted nonantigenic dermal component as a base for the cultured cells. This improves the take in the areas of retained dermis to about 95%.

Inconsistent allograft take has led to the current direction of research and clinical trials with the application of a highly processed allodermis or the use of dermal substitutes in conjunction with cultured epithelial grafts, to increase graft take and achieve more rapid integration and healing.

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